PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 10796-056	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/CA2005/000458	International filing date *(day/month/year)* 29 March 2005 (29-03-2005)	Priority date *(day/month/year)* 26 March 2004 (26-03-2004)
International Patent Classification (IPC) or national classification and IPC IPC: ***G01N 1/28*** (2006.01), ***C12M 1/34*** (2006.01), ***B01L 11/00*** (2006.01), ***C12Q 1/68*** (2006.01), ***G01N 21/05*** (2006.01), ***G01N 37/00*** (2006.01)		
Applicant INFECTIO RECHERCHE INC. ET AL		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. [X] *(sent to the applicant and to the International Bureau)* a total of 24 sheets, as follows:

      [X] sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

      [ ] sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. 1 and the Supplemental Box.

   b. [ ] *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

   [X] Box No. I Basis of the report
   [ ] Box No. II Priority
   [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   [ ] Box No. IV Lack of unity of invention
   [X] Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   [ ] Box No. VI Certain documents cited
   [ ] Box No. VII Certain defects in the international application
   [X] Box No. VIII Certain observations on the international application

Date of submission of the demand 26 January 2006 (26-01-2006)	Date of completion of this report 4 August 2006 (04-08-2006)
Name and mailing address of the IPEA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001(819)953-2476	Authorized officer Patrick Norman (819) 997-2156

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International application No.
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Box No. I Basis of the report

1. With regard to the language, this report is based on:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into , which is the language of a translation furnished for the purposes of:

[ ] international search (Rules 12.3(a) and 23.1(b))

[ ] publication of the international application (Rule 12.4(a))

[ ] international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

[ ] the international application as originally filed/furnished

[X] the description:

[X] pages	1 - 6, 8, 10 - 32, 34 - 42		as originally filed/furnished
[X] pages*	7, 9 & 33	received by this Authority on	26 Jan., 2006 (26-01-2006)
[ ] pages*		received by this Authority on	

[X] the claims:

[ ] pages			as originally filed/furnished
[ ] pages*		as amended (together with any statement) under Article 19	
[X] pages*	43-61 (claims 1 - 134)	received by this Authority on	26 Jan., 2006 (26-01-2006)
[X] pages*	62 - 63 (claims 135 - 141)	received by this Authority on	24 July, 2006 (24-07-2006)

[X] the drawings:

[X] pages	1/7 - 7/7		as originally filed/furnished
[ ] pages*		received by this Authority on	
[ ] pages*		received by this Authority on	

[ ] a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. [ ] The amendments have resulted in the cancellation of:

[ ] the description, pages

[ ] the claims, Nos.

[ ] the drawings, sheets/figs

[ ] the sequence listing *(specify):*

[ ] any table(s) related to sequence listing *(specify):*

4. [ ] This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

[ ] the description, pages

[ ] the claims, Nos.

[ ] the drawings, sheets/figs

[ ] the sequence listing *(specify):*

[ ] any table(s) related to sequence listing *(specify):*

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1 - 141	YES
	Claims	none	NO
Inventive step (IS)	Claims	1 - 141	YES
	Claims	none	NO
Industrial applicability (IA)	Claims	1 - 141	YES
	Claims	none	NO

2. Citations and explanations (Rule 70.7)

The following documents will be referred to:

D1 - WO 01/35088A1 - Wang et al
D2 - WO 03/015923A1 - Adey et al
D3 - US2002/0142470A1 - Clarke et al
D4 - "A novel design on a CD disk for 2 point calibration measurement", Madou et al, found in "Sensors and Actuators A", vol. 91(3), 2001, pages 301 - 306.
D5 - "Electrokinetically controlled microfluidic analysis systems", Bousse et al, found in "Annual review of biopsies and biomolecular structure", vol. 29, 2000, pages 155 - 181.

Novelty:

Amended claims 1 - 141 meet the requirements for novelty. PCT Article 33(2). The features defined by the independent claims 1, 59, 90, 110 and 141 are not disclosed in a single document.

Since the independent claims are novel, the dependent claims are also considered to be novel. PCT 33(2).

Inventive Step:

Claims 1 - 141 meet the requirements for inventive step. PCT Article 33(3). The features defined by the independent claims 1, 59, 90, 110 and 141 are not taught or fairly suggested by the combination of prior art.

Since the independent claims are inventive, the dependent claims are also considered to be inventive. PCT 33(3).

Industrial Applicability:

Claims 1 - 141 are considered to be industrially applicable. PCT Article 33(4).

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Acronyms in the description should be defined at least in the first instance.

Incorporation by reference - page 15, line 64 contrary to Article 5, PCT

Claims 111 and 113 lack clarity contrary to PCT Article 6. The inclusion of "and/or" creates a lack of clarity as a single of the preferred embodiments should be defined in the claims.

the microfluidic flow cell. In another embodiment, the microfluidic flow cell further comprises a common channel-cavity; the common channel-cavity defines the common channel when the microfluidic flow cell and the removable-member are in the interfaced position.

[0026] In an embodiment, the microfluidic flow cell further comprises a plurality of separate fluid-receiving portions, each fluid-receiving portion of the plurality being in fluid communication with a common channel, the common channel being in communication with the reaction chamber. In another embodiment, the separate fluid-receiving portions comprise a pair of elongate bores meeting at a common part of the common channel. In an embodiment, the common part comprises a valve. In another embodiment, the common channel is formed within the microfluidic flow cell. In an embodiment, the microfluidic flow cell comprises a common channel-cavity; the common channel-cavity defines the common channel when the microfluidic flow cell and the removable-member are in the interfaced position. In an embodiment, the pair of elongate bores are formed within the microfluidic flow cell. In an embodiment, the elongate bores are formed by complementary elongate bore portions, defined by the microfluidic flow cell and the removable-member when in the interfaced position. In an embodiment, the valve is formed within the microfluidic flow cell. In another embodiment, the microfluidic flow cell further comprises a valve-cavity; the valve-cavity defines the valve when the microfluidic flow cell and the removable-member are in the interfaced position.

[0027] In an embodiment, the microfluidic flow cell further comprises a dispensing portion in fluid communication with the reaction chamber. In an embodiment, the dispensing portion is in fluid communication with the external environment of said microfluidic flow cell. In an embodiment, the dispensing portion comprises a dispensing channel formed within the microfluidic flow cell. In another embodiment, the dispensing portion comprises a dispensing channel,

[0032] In an embodiment, the microfluidic flow cell is adapted to be actuated so as to provide for the fluid in the fluid-receiving portion to flow to the reaction chamber. In an embodiment, this actuation is provided by forces selected from the group consisting of: gravity, centrifugation, capillary force, centripetal force, gas-pressure, electro-osmosis, DC and AC electrokinetics, electrophoresis, electrowetting, magnetic force, acoustic force, pneumatic drive force, mechanical micropump force, positive and negative displacement force, thermal force, electrochemical bubble generation force, and combinations thereof.

[0033] In an embodiment, the fluid is initially in dry form and is adapted to be liquefied.

[0034] In an embodiment, the microfluidic flow cell further comprises at least one vent, this vent being in fluid communication with the ambient environment and with the reaction chamber. In another embodiment, this vent is in fluid communication with the ambient environment and with the fluid-receiving portion. In another embodiment, this vent is in fluid communication with the ambient environment and with the conduit. In another embodiment, this vent is in fluid communication with the ambient environment and with the valve. In another embodiment, this vent is in fluid communication with the ambient environment and with the common channel. In another embodiment, this vent is in fluid communication with the ambient environment and with the common channel. In another embodiment, this vent is in fluid communication with the ambient environment and with the dispensing portion.

[0035] In another embodiment, the removable-member comprises an auxiliary microfluidic flow cell.

[0036] In another embodiment, the removable-member

was used for the much larger reagent chambers. In the first step, SU-8 25 was processed on a 15 cm silicon (Si) wafer (Addison Engineering, San Jose, CA) to obtain the structures for the microchannels (25 µm in depth) and the alignment marks for the second SU-8 layer. Subsequently, a thick layer (250µm) of SU-8 100 was spin-coated over the substrate on which the molds for the microchannels had been created. This thicker layer was used to define the mold for the much larger reagent reservoirs. Since crosslinked SU-8 photoresists have lower optical transparency than their unexposed surroundings, the alignment marks can be readily observed even when they are completely covered with a thick layer of the unexposed photoresist. In the pattern design, compensations were made for possible alignment errors between the two layers of photoresist. The channels and chambers overlapped in the connection areas to avoid possible disconnections caused by misalignment. Six identical molds were simultaneously fabricated onto the 15 cm Si wafer for faster replication.

Polymerization molding of the flow cell

[0135] PDMS was purchased from Dow Corning (Midland, MI). The base (Sylguard™ 184 silicone elastomer) and the curing agent (silicone resin solution) were thoroughly mixed in a weight proportion of 10:1. Low temperature curing (e.g. 65°C) in a convection oven was preferred over high temperature baking due to the thickness of the structures. High temperatures (e.g. 150°C) causes significant thermal stress at the interface between the SU-8 patterns and the Si substrate which can actually crack the substrate and peel off the SU-8 structures. Leveling of the PDMS on the substrate is required in order to achieve a uniform thickness over all the flow cells. The appropriate combination of the macrostructures of the chambers and microstructures of the channels is important for the performance of the flow cells.

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WHAT IS CLAIMED IS:

1. A microfluidic flow cell for removably interfacing with a removable-member for performing a reaction therebetween, said microfluidic flow cell comprising:

at least one reaction portion defining with the removable-member a reaction chamber when said microfluidic flow cell and said removable-member are in an interfaced position thereof;

at least one fluid-receiving portion for receiving a fluid therein and being in fluid communication with said reaction chamber; and

a dispensing portion in fluid communication with said reaction chamber, said dispensing portion comprising a dispensing channel formed within said microfluidic flow cell;

wherein when in said interfaced position, said microfluidic flow cell is adapted to allow for the fluid in said fluid-receiving portion to flow to said reaction chamber.

2. A microfluidic flow cell according to claim 1, further comprising a conduit providing said fluid communication between said fluid-receiving portion and said reaction chamber.

3. A microfluidic flow cell according to claim 1, further comprising a plurality of separate fluid-receiving portions each receiving a respective fluid, each of said separate fluid-receiving portions being in fluid communication with a common said reaction chamber.

4. A microfluidic flow cell according to claim 3 further comprising a plurality of separate conduits, each said separate conduit providing said fluid communication between a respective said fluid-receiving portion and said common reaction chamber.

5. A microfluidic flow cell according to claim 4, wherein said plurality of separate conduits meet at a valve for fluid communication therewith, said valve being in fluid communication with said common reaction chamber.

6. A microfluidic flow cell according to claim 5, wherein said fluid communication between said reaction chamber and said valve is provided by a common channel.

7. A microfluidic flow cell according to claim 1, wherein said reaction portion comprises a reaction cavity.

8. A microfluidic flow cell according to claim 7, wherein said cavity comprises a structure selected from the group consisting of indentations and at least one groove.

9. A microfluidic flow cell according to claim 1, wherein said fluid-receiving portion comprises a reagent chamber, said fluid comprising a reagent.

10. A microfluidic flow cell according to claim 1, wherein said fluid-receiving portion comprises a fluid-receiving chamber formed within said microfluidic flow cell.

11. A microfluidic flow cell according to claim 1, wherein said fluid-receiving portion comprises a fluid-receiving cavity defining a fluid-receiving chamber with said removable-member when said microfluidic flow cell and said removable-member are in said interfaced position.

12. A microfluidic flow cell according to claim 2, wherein said conduit is formed within said microfluidic flow cell.

13. A microfluidic flow cell according to claim 2 further comprising a conduit cavity, said conduit-cavity defining said conduit when said microfluidic flow cell and said removable-member are in said interfaced position.

14. A microfluidic flow cell according to claim 3, wherein said at least one of said plurality of conduits is formed within said microfluidic flow cell.

15. A microfluidic flow cell according to claim 3, wherein at least one of said plurality of conduits is defined by a conduit in said microfluidic flow cell when said microfluidic flow cell and said removable member are in said interfaced position.

16. A microfluidic flow cell according to claim 5, wherein said valve is formed within said microfluidic flow cell.

17. A microfluidic flow cell according to claim 5 further comprising a valve-cavity, said valve-cavity defining said valve when said microfluidic flow cell and said removable-member are in said interfaced position.

18. A microfluidic flow cell according to claim 6, where said common channel is formed within said microfluidic flow cell.

19. A microfluidic flow cell according to claim 18, further comprising a common channel-cavity, said common channel-cavity

defining said common channel when said microfluidic flow cell and said removable-member are in said interfaced position.

20. A microfluidic flow cell according to claim 1, further comprising a plurality of separate fluid-receiving portions, each said fluid-receiving portion of said plurality being in fluid communication with a common channel, said common channel being in communication with said reaction chamber.

21. A microfluidic flow cell according to claim 20, wherein each said separate fluid-receiving portions comprises a pair of elongate bores meeting at a common part of said common channel.

22. A microfluidic flow cell according to claim 21, wherein said common part comprises a valve.

23. A microfluidic flow cell according to claim 20, wherein said common channel is formed within said microfluidic flow cell.

24. A microfluidic flow cell according to claim 20, further comprising a common channel-cavity, said common channel-cavity defining said common channel when said microfluidic flow cell and said removable-member are in said interfaced position.

25. A microfluidic flow cell according to claim 21 wherein said pair of elongate bores are formed within said microfluidic flow cell.

26. A microfluidic flow cell according to claim 21, wherein said elongate bored are formed by complementary elongate bore portions

defined by said microfluidic flow cell and said removable-member when in said interfaced position.

27. A microfluidic flow cell according to claim 22, wherein said valve is formed within said microfluidic flow cell.

28. A microfluidic flow cell according to claim 22 further comprising a valve-cavity, said valve-cavity defining said valve when said microfluidic flow cell and said removable-member are in said interfaced position.

29. A microfluidic flow cell according to claim 1, wherein said dispensing portion is in fluid communication with the external environment of said microfluidic flow cell.

30. A microfluidic flow cell according to claim 1, wherein said dispensing portion comprises a dispensing channel, said microfluidic flow cell further comprising a dispensing channel-cavity, said dispensing channel-cavity defining said dispensing channel when said microfluidic flow cell and said removable-member are in said interfaced position.

31. A microfluidic flow cell according to claim 1, wherein said microfluidic flow cell comprises hydrophobic material.

32. A microfluidic flow cell according to claim 1, wherein said microfluidic flow cell comprises a substrate.

33. A microfluidic flow cell according to claim 32, wherein said substrate comprises elastomeric material.

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34. A microfluidic flow cell according to claim 33, wherein said elastomeric material comprises PDMS.

35. A microfluidic flow cell according to claim 1, wherein said removable-member comprises a support for performing a reaction thereon.

36. A microfluidic flow cell according to claim 35, wherein said support comprises hydrophobic material.

37. A microfluidic flow cell according to claim 35, wherein said support is functionalized to allow for the binding of probes thereon.

38. A microfluidic flow cell according to claim 35, wherein said support comprises glass.

39. A microfluidic flow cell according to claim 1, wherein said support comprises a microarray.

40. A microfluidic flow cell according to claim 39, wherein said microarray comprises bioprobe spots.

41. A microfluidic flow cell according to claim 40, wherein said bioprobe spots are selected from the group consisting of DNA, RNA, oligonucleotides, oligonucleotide analogs, proteins, peptides, organic molecules, sugars, drugs and a combination thereof.

42. A microfluidic flow cell according to claim 39 further comprising a plurality of fluid-receiving portions and a plurality of channels in fluid communication therewith, said channels being in communication with said reaction chamber.

43. A microfluidic flow cell according to claim 42, wherein said plurality of channels access individual spots of said microarray.

44. A microfluidic flow cell according to claim 42, wherein said plurality of channels access individual groups of spots of said microarray.

45. A microfluidic flow cell according to claim 1, wherein said removable-member comprises an enclosure.

46. A microfluidic flow cell according to claim 45, wherein said enclosure comprises a removable seal.

47. A microfluidic flow cell according to claim 1 being adapted to be actuated so as to provide for the fluid in said fluid-receiving portion to flow to said reaction chamber.

48. A microfluidic flow cell according to claim 47, wherein said actuation is provided by forces selected from the group consisting of: gravity, centrifuge, capillary force, centripetal force, gas-pressure, electro-osmosis, DC and AC electrokinetics, electrophoresis, electrowetting, magnetic force, acoustic force, pneumatic drive force, mechanical micropump force, positive and negative displacement force, thermal force, electrochemical bubble generation force, and combinations thereof.

49. A microfluidic flow cell according to claim 1, wherein said fluid is initially in dry form and is adapted to be liquefied.

50. A microfluidic flow cell according to claim 1 further comprising at least one vent, said vent being in fluid communication with the ambient environment and with said reaction chamber.

51. A microfluidic flow cell according to claim 1 further comprising at least one vent, said vent being in fluid communication with the ambient environment and with said fluid-receiving portion.

52. A microfluidic flow cell according to claim 2, further comprising at least one vent, said vent being in fluid communication with the ambient environment and with said conduit.

53. A microfluidic flow cell according to claim 5, further comprising at least one vent, said vent being in fluid communication with the ambient environment and with said valve.

54. A microfluidic flow cell according to claim 18, further comprising at least one vent, said vent being in fluid communication with the ambient environment and with said common channel.

55. A microfluidic flow cell according to claim 20, further comprising at least one vent, said vent being in fluid communication with the ambient environment and with said common channel.

56. A microfluidic flow cell according to claim 1, further comprising at least one vent, said vent being in fluid communication with the ambient environment and with said dispensing portion.

57. A microfluidic flow cell according to claim 1, wherein said removable member comprises an auxiliary microfluidic flow cell.

58. A microfluidic flow ceil according to claim 1, wherein said removable-member comprises a support comprising a support cavity defining said reaction chamber when in said interfacing position, said reaction cavity comprising a fluid outlet in communication with said reaction chamber.

59. A microfluidic device comprising:

a microfluidic flow cell in combination with a removable-member;

at least one reaction chamber defined by said microfluidic flow cell and said removable-member when in an interfaced position thereof for performing a reaction therein;

at least one fluid-receiving chamber for receiving a fluid therein and being in fluid communication with said reaction chamber; and

a dispensing portion in fluid communication with said reaction chamber, said dispensing portion comprising a dispensing channel formed within said microfluidic flow cell;

wherein said microfluidic flow device is adapted to allow for the fluid in said fluid-receiving chamber to flow to said reaction chamber.

60. A microfluidic device according to claim 59, further comprising at least one conduit providing said fluid communication between said fluid-receiving portion and said reaction chamber.

61. A microfluidic device according to claim 59 further comprising a plurality of separate fluid-receiving portions each receiving a respective fluid, each of said separate fluid-receiving portions being in fluid communication with a common said reaction chamber.

62. A microfluidic device cell according to claim 61 further comprising a plurality of separate conduits, each said separate conduit providing said fluid communication between a respective said fluid-receiving portion and said common reaction chamber.

63. A microfluidic device according to claim 62, wherein said plurality of separate conduits meet at a valve for fluid communication therewith, said valve being in fluid communication with said common reaction chamber.

64. A microfluidic device according to claim 63, wherein said fluid communication between said reaction chamber and said valve is provided by a common channel.

65. A microfluidic device according to claim 59 further comprising a plurality of separate fluid-receiving portions, each said fluid-receiving portion of said plurality being in fluid communication with a common channel, said common channel being in communication with said reaction chamber.

66. A microfluidic device according to claim 65, wherein each said separate fluid-receiving portions comprises a pair of elongate bores meeting at a common part of said common channel.

67. A microfluidic device according to claim 66, wherein said common part comprises a valve.

68. A microfluidic device according to claim 59, wherein said dispensing portion is in fluid communication with the external environment of said microfluidic flow cell.

69. A microfluidic device according to claim 59, wherein said microfluidic flow cell comprises hydrophobic material.

70. A microfluidic device according to claim 59, wherein said microfluidic flow cell comprises a substrate.

71. A microfluidic device according to claim 70, wherein said substrate comprises elastomeric material.

72. A microfluidic device according to claim 71, wherein said elastomeric material comprises PDMS.

73. A microfluidic device according to claim 59, wherein said removable-member comprises a support for performing a reaction thereon.

74. A microfluidic device according to claim 73, wherein said support comprises hydrophobic material.

75. A microfluidic device according to claim 73, wherein said support is functionalized to allow for the binding of probes thereon.

76. A microfluidic device according to claim 73, wherein said support comprises glass.

77. A microfluidic device according to claim 73, wherein said support comprises a microarray.

78. A microfluidic device according to claim 77, wherein said microarray comprises bioprobe spots.

79. A microfluidic device according to claim 78, wherein said bioprobe spots are selected from the group consisting of DNA, RNA, oligonucleotides, oligonucleotide analogs, proteins, peptides, organic molecules, sugars, drugs and a combination thereof.

80. A microfluidic device according to claim 77 further comprising a plurality of fluid-receiving portions and a plurality of channels in fluid communication therewith, said channels being in communication with said reaction chamber.

81. A microfluidic device according to claim 80, wherein said plurality of channels access individual spots of said microarray.

82. A microfluidic device according to claim 79, wherein said plurality of channels access individual groups of spots of said microarray.

83. A microfluidic flow cell according to claim 78, wherein said removable-member comprises an enclosure.

84. A microfluidic device according to claim 83, wherein said enclosure comprises a removable seal.

85. A microfluidic device according to claim 59 being adapted to be actuated so as to provide for the fluid in said fluid-receiving portion to flow to said reaction chamber.

86. A microfluidic device according to claim 85, wherein said actuation is provided by forces selected from the group consisting of: gravity, centrifuge, capillary force, centripetal force, gas-pressure, electro-

osmosis, DC and AC electrokinetics, electrophoresis, electrowetting, magnetic force, acoustic forcepneumatic drive force, mechanical micropump force, positive and negative displacement force, thermal force, electrochemical bubble generation force, and combinations thereof.

87. A microfluidic device according to 59, wherein said fluid is initially in dry form and is adapted to be liquefied.

88. A microfluidic device according to claim 59 further comprising at least one vent, said vent being in fluid communication with the ambient environment and with said reaction chamber.

89. A microfluidic flow cell according to claim 59, wherein said removable member comprises an auxiliary microfluidic flow cell.

90. A microfluidic system for driving fluids, said system comprising:

at least one microfluidic device comprising:

- a microfluidic flow cell comprising at least one reaction portion and at least one fluid-receiving portion for receiving a fluid therein;

- a removable-member for interfacing with said microfluidic flow cell as to perform a reaction therebetween;

- a reaction chamber for performing a reaction therein, said reaction chamber being defined by said reaction portion when interfaced with said removable-member, said reaction chamber being in fluid communication with said fluid-receiving portion;

- a dispensing portion in fluid communication with said reaction chamber, said dispensing portion comprising a dispensing channel formed within said microfluidic flow cell; and

- a force-providing device for providing an external force onto said microfluidic device so as to provide for the fluid in said fluid-receiving portion to flow to said reaction chamber.

91. A microfluidic system according to claim 90, wherein said removable-member comprises a support, said microfluidic flow cell being positioned on said support.

92. A microfluidic system according to claim 91, wherein said support comprises glass.

93. A microfluidic device according to claim 91, wherein said support comprises a microarray.

94. A microfluidic device according to claim 93, wherein said microarray comprises bioprobe spots.

95. A microfluidic device according to claim 94, wherein said bioprobe spots are selected from the group consisting of DNA, RNA, oligonucleotides, oligonucleotide analogs, proteins, peptides, organic molecules, sugars, drugs and a combination thereof.

96. A microfluidic system according to claim 90, wherein said microfluidic flow cell comprises a substrate.

97. A microfluidic system according to claim 96, wherein said substrate comprises elastomeric material.

98. A microfluidic system according to claim 97, wherein said elastomeric material comprises PDMS.

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99. A microfluidic system according to claim 99, wherein said a force-providing device comprises a centrifuge device.

100. A microfluidic system according to claim 99, wherein said centrifuge device comprises a rotatable platform for positioning a plurality of said microfluidic devices thereon.

101. A microfluidic system according to claim 100, wherein said platform comprises microfluidic device receiving portions.

102. A microfluidic system according to claim 101, wherein said microfluidic device receiving portions comprise slots, said removable member comprising a glass support slide to be received by said slot.

103. A microfluidic system according to claim 100, wherein said rotatable platform comprises a disc.

104. A microfluidic system according to claim 103, wherein said disc comprises a central portion for operatively communicating with an actuator to be rotated thereby.

105. A microfluidic system according to claim 104, wherein said central portion comprises an opening, said actuator comprises a hub mounted to a motor.

106. A microfluidic system according to claim 103, wherein said disc comprises a waste reservoir positioned near the periphery thereof.

107. A microfluidic system according to claim 106, wherein said microfluidic device comprises a dispensing portion for dispensing fluid therethrough, said microfluidic device being positioned on said disc with said dispensing portion facing said waste reservoir, whereby during operation of said disc, said waste reservoir collects dispensed fluid.

108. A microfluidic system according to claim 90, further comprising a reaction detecting/analyzing device for detecting and/or analyzing the reaction occurring in said reaction chamber.

109. A microfluidic system according to claim 90, wherein said fluid comprises a reagent.

110. A method for driving fluids used in a reaction within a microfluidic structure, said method comprising:

(a) providing a microfluidic structure comprising a microfluidic flow network for interfacing with a removable-member for defining a reaction chamber therebetween, said reaction chamber being in fluid communication with said network;

(b) placing at least one sample fluid product within said network and at least one reacting product in one of said network and said reaction chamber; wherein said reacting product is placed on said removable-member prior to interfacing said network on said removable-member thereby defining said reaction chamber;

(c) actuating the microfluidic flow network so that products in said network are driven to said reaction chamber for providing a reaction therein; and

(d) removing at least a part of said removable-member from said network with a result of the reaction being provided on at least one of said removable-member and said network.

111. A method according to claim 110, further comprising:

(e) detecting and/or analyzing the reaction.

112. A method according to claim 111, wherein said (e) is performed before (d) so that the reaction is detected and/or analyzed within the reaction chamber.

113. A method according to claim 111, wherein the reaction is detected and/or analyzed on at least one of said removable-member and said network.

114. A method according to claim 110, wherein said at least one sample fluid product comprises a reagent.

115. A method according to claim 110, wherein said at least one sample fluid product comprises a liquid phase analyte.

116. A method according to claim 110, wherein said reacting product comprises a fluid.

117. A method according to claim 110, wherein said reacting product comprises a solid substance.

118. A method according to claim 110, wherein said reacting product comprises bioprobes.

119. A method according to claim 118, wherein said bioprobes are selected from the group consisting of DNA, RNA, oligonucleotides,

oligonucleotide analogs, proteins, peptides, organic molecules, sugars, drugs and a combination thereof.

120. A method according to claim 110, wherein said removable member comprises a support, said network being interfaced on said support.

121. A method according to claim 120, wherein said placing said at least one reacting product in said reaction chamber in step (b) comprises placing said reacting product on said support prior to interfacing said network on said support thereby defining said reaction chamber.

122. A method according to claim 120, wherein the support comprises a microarray.

123. A method according to claim 120, wherein the support comprises glass.

124. A method according to claim 120, wherein said support is functionalized to covalently bind probes.

125. A method according to claim 120, wherein said support is rendered hydrophobic.

126. A method according to claim 110, wherein said network isdefined by a microfluidic flow cell.

127. A method according to claim 126, wherein said microfluidic flow cell comprises a substrate.

128. A method according to claim 127, wherein said substrate comprises elastomeric material.

129. A method according to claim 128, wherein said elastomeric material comprises PDMS.

130. A method according to claim 126, wherein said microfluidic flow cell is rendered hydrophobic.

131. A method according to claim 110, wherein said at least one of said sample fluid product and said reacting product is initially provided as dry product, said method comprising liquefying said dry product prior to step (b).

132. A method according to claim 110, wherein at least of one of said sample fluid product and said reacting product is initially provided as dry product, said method comprising liquefying said dry product after said placing in step (b).

133. A method according to claim 110, wherein said reaction comprises a hybridization reaction.

134. A method according to claim 110, wherein said actuating comprises subjecting the microfluidic flow network to a force selected from the group consisting of: gravity, centrifuge, capillary force, centripetal force, gas-pressure, electro-osmosis, DC and AC electrokinetics, electrophoresis, electrowetting, magnetic force, acoustic force, pneumatic drive force, mechanical micropump force, positive and negative displacement force, thermal force, electrochemical bubble generation force, and combinations thereof.

135. A method according to claim 113, wherein the network comprises a series of fluid-receiving portions from a proximal to distal position relative to the reaction chamber, said step (b) comprising placing a respective said sample fluid in each of said series of fluid-receiving portions, said actuating in step (c) causing fluid products in said series of said fluid-receiving portions to be sequentially driven to said reaction chamber from the most proximal positioned to the most distal positioned said fluid-receiving portion.

136. A method according to claim 110, wherein said actuating in step (c) comprises centrifugation, said sequential driving of fluids being causes by a progressive augmentation of centrifugation speed.

137. A method according to 136, wherein said actuating in step (c) comprises centrifugation.

138. A method according to claim 110, wherein said centrifugation comprises:

placing said interfaced network and removable-member on a rotatable platform; and

actuating said platform so as to apply centrifugal force on the fluid products in said network.

139. A method according to claim 138, wherein said step (c) further comprises dispensing fluid-waste from the microfluidic structure via a dispensing portion thereof.

140. A method according to claim 138, further comprising collecting fluid waste during centrifugation via a fluid-waste-collecting portion formed on the rotatable platform.

141. A microfluidic flow cell for being removably placed on a support comprising a microarray of bioprobe spots on a portion thereof for performing a hybridization reaction therebetween, said microfluidic flow cell comprising:

at least one reaction portion defining with the microarray portion of the support a reaction chamber when said microfluidic flow cell is on the support;

at least one fluid-receiving portion for receiving a fluid therein and being in fluid communication with said reaction chamber; and

a dispensing portion in fluid communication with said reaction chamber;

wherein when said microfluific flow cell is on the support, said microfluidic flow cell and support are adapted to be acted thereon by a centrifugal force so as to allow for the fluid in said fluid-receiving portion to flow to said reaction chamber thereby causing a hybridization reaction, said microfluidic flow cell being removable from the support so that the hybridization reaction can be separately analyzed on the support.